

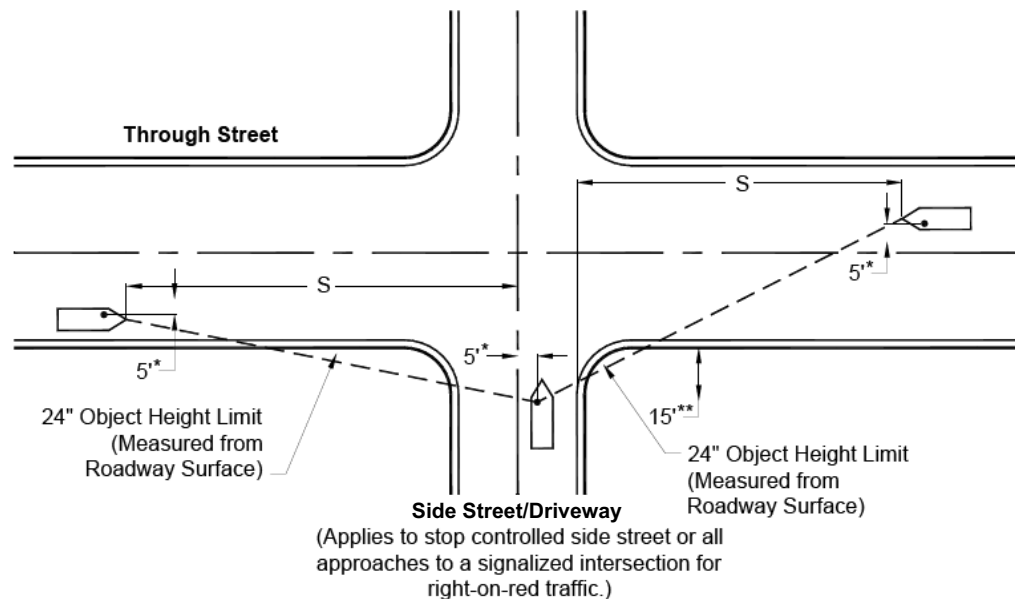


The maximum profile grade through an intersection is 6 percent for arterials and collector streets and 8 percent for local streets. The intersecting streets' profiles and cross slopes need to be coordinated with one another to ensure a safe and comfortable driving surface. Typically this may mean extending grades through the intersection for approximately 75 feet to 150 feet. Short vertical curves may be necessary in lieu of grade breaks.

D. Intersection and Driveway Sight Distance

In order to provide the opportunity for vehicles at an intersection to safely cross or make left or right turns onto a through street, adequate sight distance must be provided. Sight distance should be based on the design speed for the roadway. Design speeds for new roadways should conform to those identified in [Section 5-3.101](#) and [Appendices 5-3A](#) and [5-3B](#). Typically design speeds are 10 mph higher than the anticipated posted speed limit. The sight distance requirements outlined below are required for all private and public street intersections and at all intersections of driveways onto public or private streets. Internal driveway intersections on private property are excluded from these requirements.

[Figure 5.3-26](#) depicts the technique used to determine the driver's eye location and an approaching vehicle; a line is then drawn to connect these 2 points. Continuous unobstructed line of sight must be provided along this line and throughout the approach to the intersection, providing an unobstructed sight triangle to the side street driver. Sight lines are to be drawn on roadway and landscaping plans to represent the areas that must be free of all objects and topography in excess of 24 inches above the roadway surface, however, certain vegetation will be allowed. Vegetation placed within the sight triangle will be of a low variety that remains below 24 inches when mature. Trees can be considered within the triangle as long as the canopies are above 7 feet, they are a single trunk variety, and they are not spaced in a configuration that creates a "picket fence" effect.



* 5 feet measured to nearest lane line or centerline.

**15 feet measured from face-of-curb or edge-of-travelway.

S = Intersection sight distance in feet on drivers left and right for right turns, left turns and through traffic. (From the 2004 AASHTO *Geometric Design of Highways and Streets*)

(See [Appendices 5-3A](#), [5-3B](#), and [5-3C](#) for distance S.)

FIGURE 5.3-26. INTERSECTION & DRIVEWAY SIGHT DISTANCE REQUIREMENTS

1. Right-Angle Intersections

Right-angle intersections are those whose legs meet at an angle of 88 to 90 degrees. For these right-angle intersections the sight distances shown in [Appendices 5-3A, 5-3B, and 5-3C](#) are to be used with [Figure 5.3-26](#) to calculate the sight triangle. [Appendices 5-3A and 5-3B](#) present the intersection sight distances for all street classifications which were determined assuming passenger car traffic. [Appendix 5-3C](#) presents the sight distance requirements for varying roadway widths and design speeds for passenger cars, single unit trucks, and combination trucks. If high volumes of truck traffic are anticipated, sight distances given in [Appendix 5-3C](#) will be used. Sight distances for vehicles turning left from the main street should also be considered and calculated based on the *AASHTO Geometric Design of Highways and Streets*.

2. Skewed Intersections

For skewed intersections where the intersection angles are less than 88 degrees, sight distances must be calculated in accordance with the procedures described in *AASHTO's Geometric Design of Highways and Streets*.

3. Intersections Within or Near a Curve

Sight distance measurements, identified as S in [Figure 5.3-26](#), need to follow the curved street alignment when the intersection is within or near a horizontal curve.

4. Traffic Safety Triangles

Traffic Safety Triangles should be used as a means to limit the height of structures, vegetation, and other improvements on corner properties immediately adjacent to intersections. **Safety triangles are not to be used as a substitute for intersection sight distance!** Safety triangles provide additional visibility around corners for all intersection approaches, and should be applied to the design of perimeter walls and landscape features. Items within the safety triangle cannot be higher than 24" measured from the roadway surface. [Figure 5.3-27](#) depicts the method used to determine the safety triangle location. **The sight distance requirements contained in both [Figure 5.3-26](#) and [Figure 5.3-27](#) are applied at all corner lots.**

5. Right-of-Way at Corners

A minimum of 25-foot radius rights-of-way shall be dedicated at street intersections to provide room for traffic control and sight distance.

E. Auxiliary Lanes

An exclusive turning lane permits separation of conflicting traffic movements and removes turning vehicles from the flow of through traffic. [Figures 5.3-28 and 5.3-29](#) depict the design standards for auxiliary lanes. These standards apply for right and left turn lanes at street intersections and for deceleration lanes at mid-block driveways. The requirement for an auxiliary lane may necessitate additional rights-of-way. Modifications to the storage and transition lengths may be allowed by the Transportation Department where the conditions do not allow the full design standard to be met.

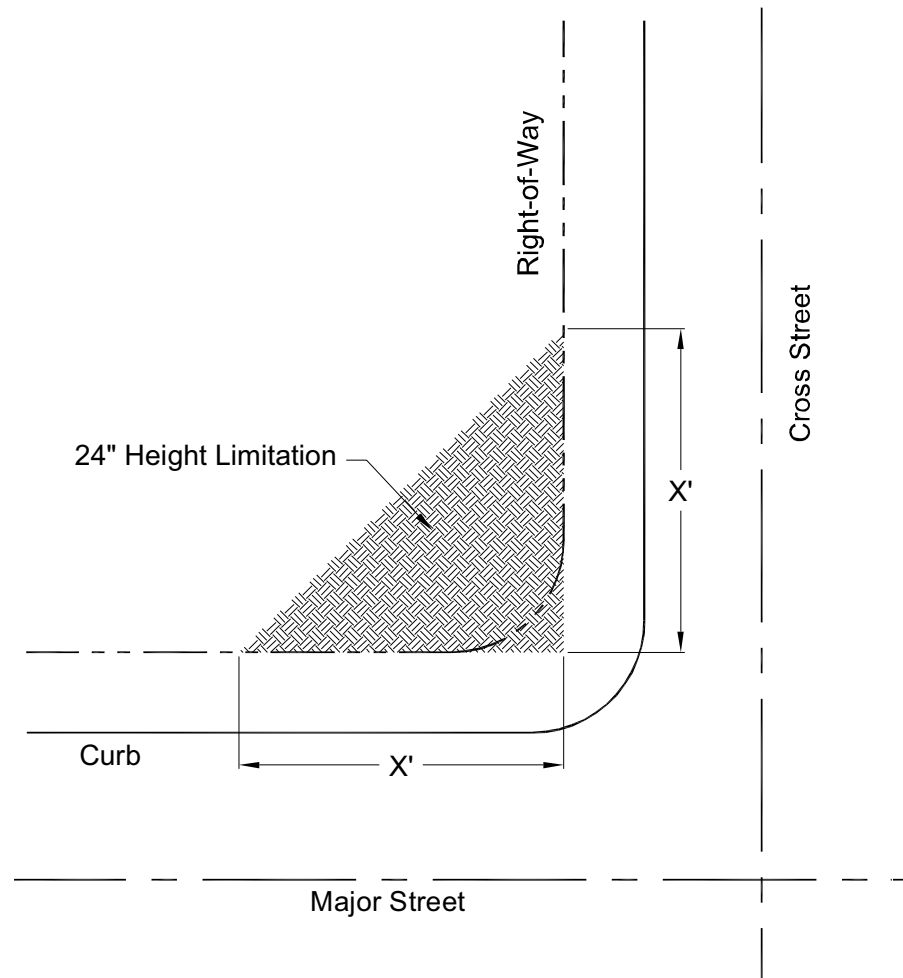
1. Right-Turn Lanes

Right-turn lanes are required at all street intersections on major arterials. Right-turn lanes may be required by the Transportation Department on minor arterial and collector street intersections. The lane lengths should be determined based on the anticipated turning volume and whether there is signalized or unsignalized traffic control. The standard storage length for a right-turn lane is 150 feet, with a 100-foot minimum length.

2. Left-Turn Lanes

Left-turn lanes are required at all street intersections on major collectors and arterials. Left-turn lanes may also be required at street intersections on minor collectors based on the projected left-turn volume and conflicting through volume. The lane lengths should be determined based on the anticipated turning volume and whether there is signalized or unsignalized traffic control. For left turn lanes at signalized intersections, dual turn

lanes should be considered when the turn volume exceeds 200 vehicles per hour, the opposing through volume exceeds 1,000 vehicles per hour, or the delay to left turning vehicles exceeds 45 seconds. Sight distance must be considered and calculated for these movements based on the AASHTO Policy on Geometric Design in order to determine the allowance of permitted left turns.



Major Street Classification	X (in feet)
Parkway, Expressway, Arterials, Major Collector	25
Minor Collector,	35
* Local Streets	35 / 60 / 70

* If the standard right-of-way (46 ft local residential, 60 ft local collector) is not available, the safety triangle (X) shall measure 60 ft on local residential streets and 70 ft on local collector streets from the centerlines of the streets.

FIGURE 5.3-27. TRAFFIC SAFETY TRIANGLE ON CORNER PROPERTY



Design Specifications for Standard Suburban Streets

Street Design Element*	Major Arterial	Minor Arterial	Major Collector	Minor Collector	Local Collector	Local Residential	Local Commercial / Industrial
Full right-of-way width [†]	150	110	100	70	60	46	60
Pavement width ^{†‡}	108	80	72	40	36	28	40
Median width - <u>C</u> urbed, <u>P</u> ainted [†]	24C [‡]	16C [‡] 12C Urban	12P	12P	12P	None	None
Type of Curb - <u>V</u> ertical, <u>R</u> olled [†]	V	V	V	V	R	R	V
Design speed (mph)	55	55	45	35	30	25	25
Length of transition for 2% superelevation	320	210	210	135	150	150	150
Minimum radius of horizontal curve without superelevation	1800	1800	1100	650	450	200	200
Minimum radius of horizontal curve with 2% superelevation	1350	1350	850	500	350	150	150
Minimum length of tangent between reverse curves	300	300	250	200	150	100	100
Minimum length of tangent between curves in same direction	660	660	500	400	300	250	250
Minimum horizontal curve length	500	500	500	400	250	100	100
Stopping sight distance	500	500	365	250	200	125	125
Passing sight distance	1990	1990	1650	1300	1100	800	800
S Intersection sight distance on drivers left and right for right turns, left turns and through traffic**	770	730	595	415	335	280	295
Minimum tangent length approaching intersection	300	300	250	200	150	100	100

* Unit of measure in feet unless otherwise noted.

[†] These first four design elements may vary for modified cross sections, such as the Urban Character streets, with approval from the Transportation Department.

[‡] Measured from back-of-curb to back-of-curb.

** If high volumes of truck traffic are anticipated, sight distances given in [Appendix 5-3C](#) will be used.



Design Specifications for Standard Rural / ESL Streets

Street Design Element*	Major Arterial	Minor Arterial	Major Collector	Minor Collector	Local Collector	Local Residential
Full right-of-way width [†]	150	110	90	70	50	40
Pavement width ^{†‡}	108	80	70	48	28	23-24
Median width - <u>C</u> urbed, <u>P</u> ainted [†]	24C [‡]	16C [‡]	8C [‡]	8C [‡]	None	None
Type of Curb - <u>M</u> ountable, <u>R</u> olled or <u>R</u> ibbon [†]	M, Ro or Ri	M, Ro, or Ri	M or Ro	Ro	Ro or RI	Ro or Ri
Design speed (mph)	55	55	45	35	30	25
Length of transition for 2% superelevation	320	210	210	135	150	150
Minimum radius of horizontal curve without superelevation	1800	1800	980	475	250	100
Minimum radius of horizontal curve with 2% superelevation	1350	1350	760	385	255	85
Minimum length of tangent btwn reverse curves	300	300	250	200	150	None
Minimum length of tangent btwn curves in same direction	660	660	500	400	300	250
Maximum horizontal curve length	500	500	500	400	250	100
Stopping sight distance	500	500	365	250	200	125
Passing sight distance	1990	1990	1650	1300	1100	800
S Intersection sight distance on drivers left and right for right turns, left turns and through traffic **	770	730	595	415	335	280
Min tangent length approaching intersection	300	300	250	200	150	100

* Unit of measure in feet unless otherwise noted.

[†] These first four design elements may vary for modified cross sections, such as those that include trails within the right-of-way, with approval from the Transportation Department.

[‡] Measured from back-of-curb to back-of-curb.

** If high volumes of truck traffic are anticipated, sight distances given in Appendix 5-3C will be used.



Intersection and Driveway Sight Distance Requirements

Six Lane Roadway

Design Speed	Sight Distance (S)					
	Passenger Car (ft)		Single Unit Truck (ft)		Combination Truck (ft)	
	TH	LT	TH	LT	TH	LT
25	350	350	470	455	540	530
30	420	420	560	545	650	635
35	490	490	655	635	760	740
40	560	560	780	725	865	845
45	630	630	840	815	975	950
50	700	700	935	905	1080	1055
55	770	770	1030	995	1190	1160

Three Lane Roadway

Design Speed	Sight Distance (S)					
	Passenger Car (ft)		Single Unit Truck (ft)		Combination Truck (ft)	
	TH	LT	TH	LT	TH	LT
25	260	295	340	375	415	450
30	310	355	410	450	495	540
35	360	415	475	525	580	630
40	415	470	545	600	660	720
45	465	530	610	675	745	810
50	515	590	680	750	825	900
55	570	650	745	825	910	990

Four Lane Roadway

Design Speed	Sight Distance (S)					
	Passenger Car (ft)		Single Unit Truck (ft)		Combination Truck (ft)	
	TH	LT	TH	LT	TH	LT
25	315	335	415	430	490	500
30	375	400	500	515	590	600
35	440	465	585	600	685	700
40	500	530	665	685	785	800
45	565	595	750	770	880	900
50	625	665	835	855	980	1000
55	690	730	915	940	1075	1100

Two Lane Roadway

Design Speed	Sight Distance (S)					
	Passenger Car (ft)		Single Unit Truck (ft)		Combination Truck (ft)	
	TH	LT	TH	LT	TH	LT
25	240	280	315	350	390	425
30	290	335	375	420	465	510
35	335	390	440	490	540	595
40	385	445	500	560	620	680
45	430	500	565	630	695	765
50	480	555	625	700	775	845
55	530	610	690	770	850	930

Notes:

- TH = Through movement, LT = Left-Turn movement
- Design speed by roadway classification is shown in [Appendices 5-3A](#) and [5-3B](#). Typically design speed is equal to the speed limit +10 mph.
- Refer to the 2004 AASHTO GEOMETRIC DESIGN OF HIGHWAYS AND STREETS for additional information.